



## **The August 21, 2017 Isola di Ischia (Casamicciola) Earthquake: Coseismic Effects**

*Version 3.10.2017*

On August 21, 2017 at 20:57 (local time) an earthquake with  $M_d = 4.0$  (Lat.  $40.74^\circ$ , Long  $13.90^\circ$ , hypocentre's depth at about 2 km) hit the Ischia island heavily damaging the Casamicciola village and causing two fatalities (Azzaro et al., 2017). The island of Ischia (Southern Italy) is the emerged portion of a volcanic complex belonging to Campi Flegrei volcanic field, located Northwest of the Gulf of Naples inside of the Campanian volcanic province.

Volcanic activity begun around 150.000 years ago and continued until 1302, with the last lava flow eruption of the Arso.

A composite surveying team (EMERGEIO INGV in collaboration with CNR/IAMC) activated immediately since August 22 in order to perform the first investigations of the coseismic effects at the surface. The Emergeio Working Group surveyed the epicentral area and surroundings, in the northern sector of the Ischia island, collecting about 50 observation points related to different geological coseismic effects (Fig. 1).

In general, the whole investigated area shows different fractures on both ground and manufactures, on roads pavement and on terrain. Widespread sliding phenomena of drywalls were also observed, as well as modest gravitational phenomena and small landslides in volcanoclastic deposits. The observed coseismic effects cover a total length of about 2 km between the Fango (Lacco Ameno), to the West, and Bagni (Casamicciola), to the East, for a total area of  $2.5 \text{ km}^2$ .

The fracture directions range from WNW-ESE to E-W and WSW-ENE with lengths up to some tens of meters as shown from the rose diagram in Fig. 1; such directions are consistent with E-W and WNW-ESE faults systems reported in the geological map (Carta Geologica dell'Isola d'Ischia della Regione Campania in scala 1:10.000, Foglio 464, 2011) and in scientific papers (Vezzoli, 1988; de Vita et al., 2006; Nappi et al., 2010) (Fig. 1).

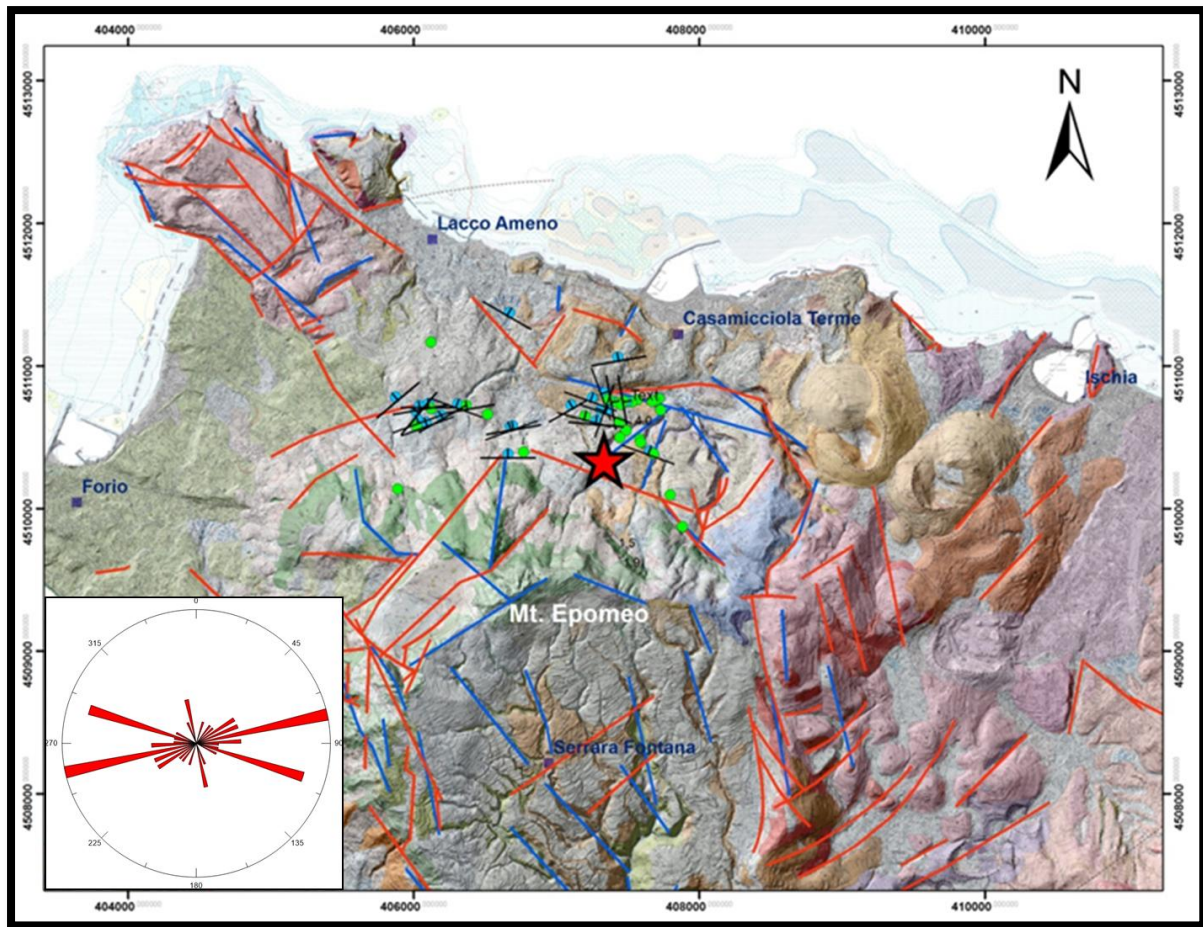


Fig.1- Location of the observed surface coseismic effects collected in field: observed fractures (blue circles with black lines representing strike and dip); collapses and sliding phenomena (green circles). The base map is the Geological map of the Ischia island (Carta Geologica dell'Isola d'Ischia della Regione Campania, sheet 464, scale 1:10.000), with faults from De Vita et al., 2006 (red lines), and lineaments from Nappi et al., 2010 (light blue). The red star shows the epicentral location of the August 21, 2017 mainshock; the rose diagram shows the trends of the coseismic surface fractures.

In via Crateca, Fango locality (Lacco Ameno) surface fractures developed in the ground and along some roads with lengths up to some tens of meters. In addition, some fractures in the soil showed openings of about 3 cm, and in some cases a vertical component of appreciable displacement with lowering of the ground northward (Picture 1).

Some examples of a system of parallel surface coseismic fractures breaking both manufactures, ground and road pavement were recorded in via Montecito (Casamicciola) (Picture 2).



Picture1: Coseismic fractures in via Crateca, Fango locality (Lacco Ameno).

Collapse phenomena of drywalls and modest gravitational phenomena such as small size sliding of a few m<sup>3</sup>, besides small landslides in volcanoclastic deposits with direction of movement from S to N were observed in the investigated area (Picture 2 and 3).



Picture 2: System of parallel surface coseismic fractures and drywall sliding in via Montecito (Casamicciola).



Picture 3: Collapse phenomena of drywalls at Casamicciola, in via dei Carri, (a), and in via Nizzola (b); Small landslides in volcanoclastic deposits in via Nizzola (c) and in via S. Barbara (d).

Along the Montecito fault system, striking E-W at the base of the Mt. Epomeo northern slope, there are the fumarolic fields of Montecito (Pantane zone) and one of Pizzone more to the west. On both these fumarolic fields, thermal camera and thermocouple measurements were carried out. The recorded temperature of 98°C is consistent with measurements performed between 2008 and 2014 (Figure 2 and 3).

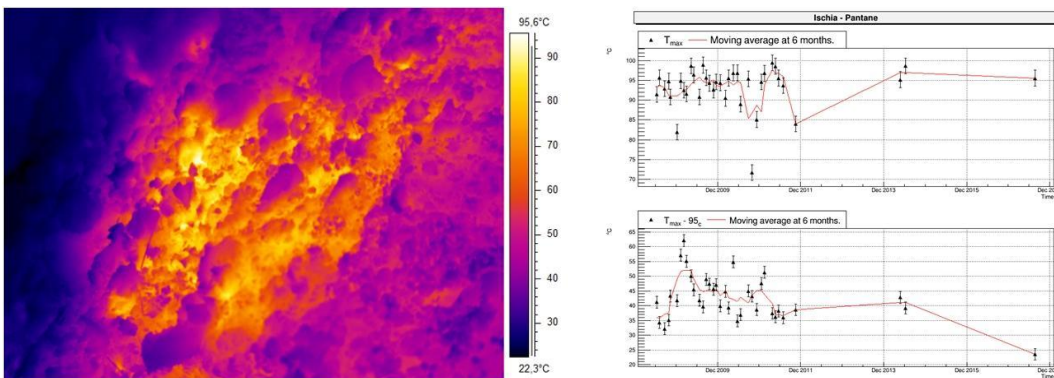


Fig. 2: Pantane: Thermal images recorded on August 24th. The diagram on the right shows the trend of maximum temperatures from 2008 as acquired by thermal images.

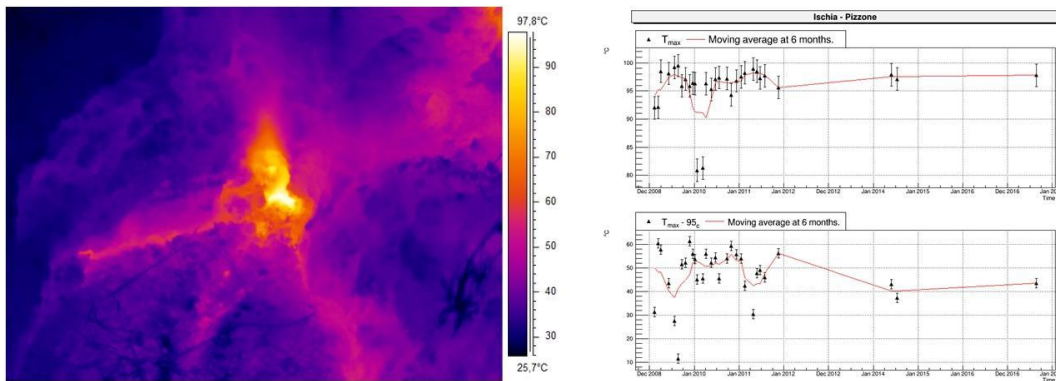


Fig. 3. Pizzone: Thermal images on August 24th. The diagram on the right shows the trend of maximum temperatures from 2008 as acquired by thermal images.

All the detected effects are generally consistent with other field observations and geophysical parameters (*Gruppo di Lavoro INGV sul terremoto dell'isola di Ischia 2017. Rapporto di sintesi preliminare sul Terremoto dell'isola d'Ischia (Casamicciola) M 4.0 del 21 agosto 2017, 6 settembre 2017, doi: 10.5281/zenodo.886045*) and in particular with: i) the macroseismic survey detected by the QUEST-INGV group (<https://ingvterremoti.files.wordpress.com/2017/08/casamicciola-report-prelimquest.pdf>), ii) the deformation field highlighted by the CNR-IREA SAR data ([http://www.irea.cnr.it/index.php?option=com\\_k2&view=item&id=799:terremoto-ischia](http://www.irea.cnr.it/index.php?option=com_k2&view=item&id=799:terremoto-ischia)), iii) the tiltmetric data detected by the INGV-Osservatorio Vesuviano ([http://www.ov.ingv.it/ov/bollettini-mensili campania/Bollettino%20Mensile%20Ischia%202017\\_08.pdf](http://www.ov.ingv.it/ov/bollettini-mensili%20campania/Bollettino%20Mensile%20Ischia%202017_08.pdf)).

**EMERGEO WorkingGroup**

*Rosa Nappi, Giuliana Alessio, Pasquale Belviso, Germana Gaudiosi, Enrica Marotta, Rosella Nave, Rosario Peluso, Valeria Siniscalchi, Riccardo Civico, Luca Pizzimenti, and Sabina Porfido (CNR-IAMC).*

**Esclusione di responsabilità e limiti di uso delle informazioni**

*L'INGV, in ottemperanza a quanto disposto dall'Art.2 del D.L. 381/1999, svolge funzioni di sorveglianza sismica e vulcanica del territorio nazionale, provvedendo all'organizzazione della rete sismica nazionale integrata e al coordinamento delle reti sismiche regionali e locali in regime di convenzione con il Dipartimento della Protezione Civile.*

*L'INGV concorre, nei limiti delle proprie competenze inerenti la valutazione della Pericolosità sismica e vulcanica nel territorio nazionale e secondo le modalità concordate dall'Accordo di programma decennale stipulato tra lo stesso INGV e il DPC in data 2 febbraio 2012 (Prot. INGV 2052 del 27/2/2012), alle attività previste nell'ambito del Sistema Nazionale di Protezione Civile.*



*In particolare, questo documento<sup>1</sup> ha finalità informative circa le osservazioni e i dati acquisiti dalle Reti di monitoraggio e osservative gestite dall'INGV.*

*L'INGV fornisce informazioni scientifiche utilizzando le migliori conoscenze scientifiche disponibili al momento della stesura dei documenti prodotti; tuttavia, in conseguenza della complessità dei fenomeni naturali in oggetto, nulla può essere imputato all'INGV circa l'eventuale incompletezza ed incertezza dei dati riportati.*

*L'INGV non è responsabile dell'utilizzo, anche parziale, dei contenuti di questo documento da parte di terzi e di eventuali danni arrecati a terzi derivanti dal suo utilizzo.*

*La proprietà dei dati contenuti in questo documento è dell'INGV.*



Quest'opera è distribuita con Licenza  
[Creative Commons Attribuzione - Non opere derivate 4.0 Internazionale](https://creativecommons.org/licenses/by-nc/4.0/).

---

<sup>1</sup> Questo documento rientra nella categoria di livello 3 come definita nei “Principi della politica dei dati dell'INGV (D.P. n. 200 del 26.04.2016)”.